

Amendments to the Claims:

The following listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) An electrolytic phosphate chemical treatment method of forming a film composed of a phosphate compound and a metal that is reduced and precipitated from an ionic state on the surface of a metal material article to be treated, comprising:

performing the electrolytic treatment on said metal material article in a phosphate chemical treatment bath by contacting said metal material article ~~having electrical conductivity~~ with said phosphate chemical treatment bath containing phosphate ions, phosphoric acid, nitrate ions, metal ions that form a complex with the phosphate ions in said phosphate chemical treatment bath, and metal ions for which the dissolution-precipitation equilibrium potential at which the metal ions dissolved in said phosphate chemical treatment bath are reduced and precipitate as metal is equal to or greater than -830 mV, which is the cathodic reaction decomposition potential of water when indicated as a hydrogen standard electrode potential, wherein

the electrolytic phosphate chemical treatment involves the application of voltage and current from an external power supply, and either anodic electrolysis is carried out using the metal material article for the anode or cathodic electrolysis is carried out using the metal material article for the cathode;

the phosphate chemical treatment bath has a pH of ~~less than 22.5 or lower~~ and is substantially free of metal ions, other than those which are a component of the film which will form sludge;

Fe is present and an amount of Fe ions dissolved in the phosphate chemical treatment bath is controlled by changes in the amount of Fe ions dissolved into the phosphate

chemical treatment bath from a Fe electrode and/or a metal material article to be treated of a steel material so that the phosphate chemical treatment bath does not contain Fe³⁺ ions in an amount of more than the solubility limit;

NO₂ and/or N₂O₄ gasses is separated from the phosphate chemical treatment bath generated and dissolved in the electrolytic treatment bath are removed from the treatment bath by separating a treatment tank into an electrolytic treatment tank that carries out electrolytic treatment and an auxiliary tank that does not carry out electrolytic treatment, circulating the treatment bath between the two tanks, and providing a mechanism that opens treatment liquid to the atmosphere at a reduced pressure either between the two tanks or within the two tanks, as a means of separating NO₂ and/or N₂O₄ gas formed in the treatment accompanying electrolytic treatment from the treatment bath; and

the oxidation-reduction potential (ORP) of said phosphate chemical treatment bath, indicated as the potential relative to the hydrogen standard electrode potential, is maintained at 770 mV to 960 mV, and is used to monitor the phosphate chemical treatment bath.

2. (Previously Presented) The electrolytic phosphate chemical treatment method according to claim 1, wherein said electrolytic treatment uses for an electrode material that dissolves in the phosphate chemical treatment bath the metal ions that form a complex with a phosphoric acid and the phosphate ions in the phosphate chemical treatment bath, the metal material article for which the dissolution-precipitation equilibrium potential at which the metal ions dissolved in the phosphate chemical treatment bath are reduced and precipitate as the metal is greater than or equal to -830 mV, which is the cathodic reaction decomposition potential of water when indicated as the hydrogen standard electrode potential, or a metal material that is insoluble during the electrolytic treatment.

3. (Previously Presented) The electrolytic phosphate chemical treatment method according claim 1, wherein the amount of Fe ions dissolved into the phosphate chemical treatment bath provides that said ORP of the phosphate chemical treatment bath is 800 mV to 960 mV and maintains the amount of Fe ions within a solubility limit of Fe^{3+} ions.

4. (Previously Presented) The electrolytic phosphate chemical treatment method according to claim 1, wherein the amount of Fe ions dissolved into the phosphate chemical treatment bath provides that said ORP of the phosphate chemical treatment bath is 770 mV to 960 mV.

5. (Previously Presented) The electrolytic phosphate chemical treatment method according to claim 1, comprising a second electrode used in the electrolytic treatment for making the ORP of the phosphate chemical treatment bath 770 mV to 960 mV, and wherein said second electrode is an insoluble metal material.

6-7. (Canceled)

8. (Currently Amended) The electrolytic phosphate chemical treatment method according to claim 1, wherein the metal ions that form a complex with ~~the phosphoric acid~~ and the phosphate ions in the phosphate chemical treatment bath are at least one of Zn, Fe, or Mn ions.

9. (Canceled)

10. (Currently Amended) The electrolytic phosphate chemical treatment method according to ~~claim 9~~claim 1, wherein the auxiliary tank that does not carry out the electrolytic treatment has a mechanism in which the treatment liquid is passed through a permeable solid structure.

11. (Original) The electrolytic phosphate chemical treatment method according to claim 10, wherein the solid structure is a film.

12. (Currently Amended) The electrolytic phosphate chemical treatment method according to ~~claim 9~~claim 1, wherein a filter having a mechanism that filters the treatment liquid is used for the auxiliary tank that does not carry out the electrolytic treatment.

13. (Currently Amended) The electrolytic phosphate chemical treatment method according to ~~claim 9~~claim 1, further comprising removing, through a liquid circulation circuit, a portion of the treatment liquid at a location prior to being introduced into a filter material in a filter, exposing the removed treatment liquid to the atmosphere, and returning it to the electrolytic treatment tank after separating NO₂ and N₂O₄ present in the treatment liquid.

14. ~~(Currently Amended)~~ The electrolytic phosphate chemical treatment method according to ~~claim 9~~claim 1, wherein an oxidation-reduction potential of the treatment bath is 800 mV to 960 mV.

15. (Currently Amended) The electrolytic phosphate chemical treatment method according to ~~claim 9~~claim 1, wherein the treatment bath is maintained in a constant state by measuring an oxidation-reduction potential value of the treatment bath and changing an amount and/or composition of replenishing chemical corresponding to the change in that value.

16. (Previously Presented) The electrolytic phosphate chemical treatment method according to claim 1, wherein the ORP of said phosphate chemical treatment bath is maintained at 800 mV to 960 mV.

17. (Canceled)

18. (New) The electrolytic phosphate chemical treatment method according to claim 1, wherein when performing the anodic electrolysis of said article to be treated, the anodic electrolysis is controlled by controlling the amount of Fe²⁺ ions dissolved into the phosphate chemical treatment bath from said metal material article to be treated of a steel material (Fe → Fe²⁺ + 2e) so that the phosphate chemical treatment bath does not contain

Fe³⁺ ions more than the solubility limit when said Fe²⁺ ions are oxidized to Fe³⁺ (Fe²⁺ → Fe³⁺ + e).

19. (New) The electrolytic phosphate chemical treatment method according to claim 1, wherein when performing the cathodic electrolysis of said article to be treated using a Fe electrode for an anode, the cathodic electrolysis is controlled by controlling the amount of Fe²⁺ ions dissolved into the phosphate chemical treatment bath from said Fe electrode (Fe → Fe²⁺ + 2e) so that the phosphate chemical treatment bath does not contain Fe³⁺ ions more than the solubility limit when said Fe²⁺ ions are oxidized to Fe³⁺ (Fe²⁺ → Fe³⁺ + e).